Women's HIV knowledge and condom use across diverse relationship types in the Dominican Republic and Haiti

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*****Note: Tables may be found at the end of this formatted document.*****

Abstract:

The two countries of the island of Hispaniola, the Dominican Republic and Haiti, are home to more than three-quarters of all people living with HIV in the Caribbean (UNAIDS, 2016). In 2015 an estimated 130,000 Haitian and 68,000 Dominican adults and children were living with HIV (UNAIDS, 2016). Although both the Dominican Republic (DR) and Haiti experienced declines in HIV incidence in the past decade, overall adult (ages 15–49 years) prevalence remains relatively high: 1.7% in Haiti and 1.0% in the DR (UNAIDS, 2016). As HIV prevalence has stabilized, there has been a shift in infections towards women (Cayemittes et al., 2001; CESDEM & Macro International, 2008; Gaillard et al., 2006; Halperin, de Moya, Pérez-Then, Pappas, & Garcia Calleja, 2009), highlighting the need to understand factors affecting women's HIV knowledge and related behaviors.

Keywords: HIV knowledge | sexual relationships | condom use

Chapter:

Introduction

The two countries of the island of Hispaniola, the Dominican Republic and Haiti, are home to more than three-quarters of all people living with HIV in the Caribbean (UNAIDS, 2016). In 2015 an estimated 130,000 Haitian and 68,000 Dominican adults and children were living with HIV (UNAIDS, 2016). Although both the Dominican Republic (DR) and Haiti experienced declines in HIV incidence in the past decade, overall adult (ages 15–49 years) prevalence remains relatively high: 1.7% in Haiti and 1.0% in the DR (UNAIDS, 2016). As HIV prevalence has stabilized, there has been a shift in infections towards women (Cayemittes et al., 2001; CESDEM & Macro International, 2008; Gaillard et al., 2006; Halperin, de Moya, Pérez-Then, Pappas, & Garcia Calleja, 2009), highlighting the need to understand factors affecting women's HIV knowledge and related behaviors.

Statistics on HIV in the Dominican Republic show important prevention successes over time, as well as areas where work is still needed. In 2015, HIV prevalence among Dominican adults 15–49 years old was 1.0% (UNAIDS, 2016). Testing data from the 2013 Dominican Republic Demographic and Health Survey indicate differences across age and gender groups, with women showing slightly lower overall HIV prevalence (0.7%) than men (0.9%) (CESDEM, 2014). These recent data are encouraging. In the past 15 years, the DR has been successful in decreasing HIV infections and risk behaviors among high-risk groups including male and female sex workers and heterosexual men with multiple partners (Halperin et al., 2009; Kerrigan, Moreno, Rosario, & Sweat, 2001; Kerrigan et al., 2003; Kerrigan et al., 2006). From 2005 to 2015, HIV/AIDS went from being the third leading cause of death to the seventh (Institute for Health Metrics and Evaluation, 2017). However, there is still work to be done in addressing HIV, particularly among women. Prevalence among pregnant women may be as high as 1.5% (República Dominicana Consejo Presidencial del SIDA, 2009), and women of lower socioeconomic status (SES) may be at increased risk for HIV infection compared to women of higher SES (Ashburn, Kerrigan, & Sweat, 2007). Thus, prevention efforts that focus on women in the Dominican Republic should be maintained and strengthened to reduce HIV transmission and to eliminate disparities in infection rates.

In Haiti, national HIV prevalence was estimated in 2015 to be 1.7% among adults aged 15–49 years (UNAIDS, 2016). The 2012 Haiti Demographic and Health Survey estimated national prevalence among 15–49-year-olds to be 2.2%, with higher prevalence among women (2.7%) than among men (1.7%) (Cayemittes et al., 2013). As in the DR, Haiti has shown important progress in preventing HIV over the past 10–15 years, including an overall decline in infections (at least prior to the 2010 earthquake) and a decline in infections among women receiving antenatal care (Cayemittes et al., 2013; Gaillard et al., 2006; Koenig et al., 2010). However, the country's political and economic conditions and the effects of natural and human-influenced disasters (including the 2010 earthquake and the cholera epidemic that followed) put some of these gains at risk. The gender disparity in the Haitian HIV epidemic indicates that prevention efforts should explicitly address the risks and needs of Haitian women.

Heterosexual sex is the primary mode of HIV transmission in both the DR and Haiti, and patterns of sexual partnering continue to drive the HIV epidemic (UNAIDS, 2016). In both countries, for women, serial monogamy—having one sexual partner for a period of time, and only gaining a new sexual partner when the prior relationship has ended—and few lifetime sexual partners are the behavioral norms. However, for men, normative behavior includes concurrent partnerships—having more than one sexual partner over the same period of time—and a greater number of lifetime partners. For example, studies show that for both the DR and Haiti, nearly 30% of sexually active men report having two or more partners in the past year, as compared with fewer than 3% of sexually active women (Cayemittes et al., 2001; Molina Achécar, Ramirez, Polanco, & Quiterio, 2003). Despite the concentration of sexual risk behaviors among men, women remain at risk for HIV infection for both social and biological reasons. Part of their risk comes from sexual networks; women may be monogamous but their partners are not. Further, HIV transmission is more efficient from males to females than from females to males (Nicolosi et al., 1994). Improving HIV prevention efforts in the contexts of both the Dominican Republic and Haiti will require greater understanding of heterosexual relationships and the factors affecting risk behavior within different types of relationships.

Therefore, the purpose of this chapter is to examine the social, demographic, and behavioral characteristics associated with HIV knowledge and condom use among women in the Dominican Republic and Haiti, and to explore these associations across relationship type.

Background

Women, Relationships, and HIV Risk

Sociodemographic characteristics such as relationship type, age, and socioeconomic status fundamentally affect women's life experiences, opportunities, resources, and choices, including those related to health, sexual behavior, and HIV. Because sexual behaviors occur within the context of interpersonal relationships, the nature of the relationship can affect women's vulnerability to HIV infection, both by influencing awareness or intentions and by affecting the ability to follow intentions with behavior (Blanc, 2001). Theory and empirical evidence suggest that different norms of behavior and ideals about appropriate emotional attachments (e.g., attraction, love, respect, loyalty, fidelity) apply to different relationship types (Connell, 1987). In many areas of the world, ideals of fidelity, trust, and intimacy are more strongly associated with formal and common-law marriages than other, more casual relationship types. Relationship-based norms and ideals make women in marriages and stable unions less likely than women in more casual relationships to engage in several critical components of safer sexual behavior: (1) to know about or admit the risk behaviors of their partners (Hirsch, Higgins, Bentley, & Nathanson, 2002; Hirsch et al., 2007); (2) to talk about sexual risk and condom use with their partners (Amaro, 1995; Hirsch et al., 2002; Mumtaz, Slaymaker, & Salway, 2005); and (3) to use condoms (Macaluso, Demand, Artz, & Hook, 2000; Mumtaz et al., 2005; O'Sullivan, Harrison, Morrell, Monroe-Wise, & Kubeka, 2006; O'Sullivan, Hoffman, Harrison, & Dolezal, 2006; Wingood & DiClemente, 1998). Further, within stable relationship types, HIV knowledge and behaviors may vary based on the living arrangements of partners. In the Dominican Republic and Haiti it is common for partners in marriages or stable unions to live apart, and many women in these types of relationships know or suspect that their partner has other sexual partners (Ulin, Cayemittes, & Metellus, 1993). As a result, women in these "living-apart" unions may be more likely than women in unions with the partner living in the home to seek out information about HIV and to be motivated to use condoms with their partners. On the other hand, women with the partner living outside the home may have limited ability to successfully negotiate condom use (e.g., due to limited partner communication skills, wanting to avoid angering or offending the partner, or desiring to comply with perceived partner desires for condomless sex).

Age is linked to women's HIV-related outcomes, because the types of behaviors and relationships that are appropriate in a given social context may be dependent on age (Gagnon, 1990). In developed countries, research indicates that young adults have greater number of sexual partners and more casual relationships, but also greater condom use, as compared with older adults (typically age 25 and older) (Abma, Martinez, Mosher, & Dawson, 2004; Fergus, Zimmerman, & Caldwell, 2007; Mosher, Martinez, Chandra, Abma, & Willson, 2004). In developing countries with high HIV prevalence, several studies have shown that younger women tend to have partners with riskier sexual behaviors (e.g., concurrent partnerships or sex with sex workers) than older women (Boerma, Gregson, Nyamukapa, & Urassa, 2003; Caldwell, 2000; Caldwell, Caldwell, Caldwell, & Pieris, 1998; O'Sullivan, Harrison et al., 2006; O'Sullivan,

Hoffman et al., 2006; Varga, 2003). This evidence suggests that younger women may be more aware of their HIV risk, making them more likely to seek out information about HIV and more likely to use condoms.

Women's socioeconomic status (SES) is also of interest because it affects access to information, resources, and services. Prior research in developed countries has shown a positive association between measures of SES such as education and protective behaviors such as condom use, for both women and men (Manderson, Tye, & Rajanayagam, 1997). In some developing countries, however, the opposite may be true. A more recent analysis of data from five sub-Saharan African countries found education—and in some cases, wealth—to be associated with greater likelihood of HIV infection for both women and men (Fortson, 2008). In the DR and Haiti, studies have shown that low SES can act as a significant constraint on behaviors including health care seeking and condom use (Behforouz, Farmer, & Mukherjee, 2004; Koenig, Léandre, & Farmer, 2004; Louis, Ivers, Smith Fawzi, Freedberg, & Castro, 2007; Miller, Tejada, & Murgueytio, 2002; Smith Fawzi et al., 2006). As measures of SES, *household wealth* reflects the overall resources and life circumstances of women, and *educational attainment* reflects literacy, socialization that occurs through formal schooling, and the potential for women to be economically independent from their male partners.

To date, relatively few population-based studies have examined characteristics associated with women's HIV knowledge and condom use in either Haiti or the DR. In the absence of a vaccine or daily preventive medication for HIV, condom use remains a critical tool for preventing HIV. Insufficient attention has been placed on the relationship context of sexual behavior and sexual health in these countries despite an extensive literature on the nature of Haitian and Dominican intimate relationships (exceptions include Fitzgerald et al., 2000; Kershaw et al., 2006; and Ulin et al., 1993). This analysis uses nationally representative survey data from the Dominican Republic and Haiti to examine two research questions: (1) What are the social, demographic, and behavioral characteristics of women in different relationship types in the DR and Haiti? (2) How are social, demographic, and behavioral characteristics associated with HIV knowledge and condom use across relationship types in the DR and Haiti?

Methods

Study Design

Data Sources

This study analyzed data from two nationally representative household surveys: the Haiti 2012 and Dominican Republic 2013 Demographic and Health Surveys (DHS). These surveys gather information from households and from women and men of reproductive age (described in detail below) and cover a broad range of population and health indicators including sociodemographic characteristics, fertility and family planning, marital history, sexual behaviors, and knowledge and attitudes about HIV. In both countries, two-stage stratified sampling was used to achieve a sample representative at the national and provincial levels. The resulting samples included 9372 women in 11,464 households in the DR and 14,287 women in 13,181 households in Haiti.

The questionnaires and protocols for the DHS were approved by the institutional review boards of ORC Macro and Dominican and Haitian collaborating agencies prior to data collection.

Study Population

The DR and Haiti DHS surveys gather data from all women aged 15–49 in sample households. In the current study, respondents who had not been sexually active in the 12 months prior to the survey, who were missing information on the study outcomes, or who had inconsistent reports of their current relationship status or last sexual partner were excluded from analysis. In addition, one woman who met these inclusion criteria was randomly selected from each sample household. This resulted in an analytic sample of 6220 women in the DR and 8017 women in Haiti.

Study Variables

Several demographic, socioeconomic, and behavioral characteristics of women were examined in this study, including relationship type, age, educational attainment, household wealth, and family planning behavior. The variable for *relationship type* was based on women's answers to several questionnaire items. Respondents indicated whether they were currently married (*casada* in the DR; *mariée* or *placée* in Haiti); in union or living together (*viviendo en union* in the DR; *viv avek* or *vit ensemble* in Haiti); widowed, divorced, or separated; or never married. Women were also asked whether their partner currently lives in the same home with them. A relationship typology variable with the following categories was created: (1) married/in union, partner living in the home; (2) married/in union, partner staying away; (3) formerly married/in union; and (4) never married.

Women's *age* was measured in years on the date of the interview, and ranged from 15 to 49 years. Women's *education* was measured as the highest grade level completed. For the current study, education was collapsed into a dichotomous variable based on initial sensitivity analyses; the variable was coded as (1) completed grade five or higher, and (0) grade four or lower. Missing values on education (0.02% in the DR and 0.08% in Haiti) were imputed from sociodemographic and behavioral characteristics using multiple linear regression.[1] *Household wealth* was measured using an index of household assets and amenities developed by ORC Macro (Rutstein & Johnson, 2004). The national distribution of household wealth index scores was divided into quintiles to create an ordinal variable for household wealth. *Family planning behavior* was assessed using questionnaire items about pregnancy and contraceptive use. Women who were not pregnant and were not using any modern contraception other than condoms were coded as (1) at risk for pregnancy; women who were pregnant or who were using modern contraception other than condoms (e.g., using oral contraceptive pills, intrauterine devices, injections, Norplant, diaphragms, or female or male sterilization) were coded as (0) not at risk for pregnancy. This coding scheme allowed the distinction between condom use that was likely exclusively for disease prevention and condom use that was not exclusively for disease prevention (i.e., possibly pregnancy prevention as well).

[1] The characteristics used in this imputation model included age, place of residence (urban/rural), province, number of children, recency of sexual intercourse, pregnancy, use of modern contraceptives, household wealth, household transportation, relationship type, use of health services, HIV knowledge, and condom use.

The analyses in this chapter examined two dichotomous outcomes: knowledge about HIV transmission and prevention, and use of condoms at last sexual intercourse. The measure for *HIV knowledge* used in this study was based on available DHS questionnaire items (common to both countries) about HIV transmission and prevention. These items encompassed whether HIV can be prevented by condom use and by being faithful to one partner; whether a healthy person can be infected with HIV; whether HIV can be passed from a mother to her baby; and whether HIV can be transmitted by insects or by sharing food. Respondents with correct answers to all items were coded as having comprehensive, correct knowledge about HIV. Respondents who had not heard about HIV/AIDS, respondents who did not know HIV/AIDS could be prevented, and respondents who did not answer all six knowledge items correctly were coded as having incomplete HIV knowledge. The resulting dichotomous HIV knowledge variable was coded (1) comprehensive correct knowledge about HIV and (0) incomplete knowledge about HIV. *Condom use at last sexual intercourse* was based on the question, "The last time you had sexual intercourse, did you use a condom?" Valid responses were yes and no. Responses were used to create a dichotomous variable, coded (1) condom used at last sex and (0) no condom used at last sex.

Statistical Analysis

Descriptive analyses were conducted to assess the social, demographic, and behavioral characteristics of sexually active Dominican and Haitian women. Bivariate analyses (Chi-squared analysis and ANOVA, as appropriate) were conducted to assess the distributions of study variables across relationship type. Logistic regression analyses stratified by relationship type were conducted to examine the associations of age and socioeconomic status with HIV knowledge and condom use in the two countries. Separate logistic regression analyses were conducted for each outcome and in each country. All analyses were completed using Stata 13.1/SE (StataCorp, College Station, TX) and used survey estimation procedures to weigh the data and account for the multistage stratified designs of the two samples.

Results

Demographic, Socioeconomic, and Behavioral Characteristics

Tables 18.1 and 18.2 present demographic, socioeconomic, and behavioral characteristics for the Dominican and Haitian samples (sexually active women aged 15–49), including unweighted sample sizes and weighted means and percentages. As shown in Table 18.1, the Dominican sample was on average 31 years old with about 10 years of completed education. The average age at first sex was 17 years. Most Dominican women reported being married or in a union with the partner living in the home (4247; 62.6% of the sample); lower proportions of women reported being formerly married or in union (i.e., widowed, divorced, or separated; 1106; 19.8%), never married/in union (478; 11.1%), and married/in union with the partner living away (389; 6.5%). Three-quarters of women in the Dominican sample were either pregnant or currently using modern contraception other than condoms. With regard to the two study outcomes, 47% of Dominican women had comprehensive knowledge about HIV prevention and transmission, and 16% reported using a condom the last time they had sexual intercourse.

As shown in Table 18.2, the Haitian sample was slightly younger, had less formal education, and showed greater variation in relationship type than the Dominican sample. Haitian women were on average 30 years old with about 6 years of completed education. The average age at first sex was 17 years. Approximately half of women in the Haitian sample (4717; 52.3% of the sample) reported being married or in a union with the partner living in the home; an additional 23.7% (1751) were married/in union with the partner living away, and the remainder were never married/in union (1146; 18.6%) or formerly married/in union (403; 5.4%). Just over one-fourth of Haitian women were either pregnant or currently using modern contraception other than condoms. Finally, 36% of Haitian women had comprehensive, and correct HIV knowledge, and 21% reported using a condom at last sexual intercourse.

Descriptive statistics stratified by relationship type are presented in the four left-hand columns of Tables 18.1 and 18.2. ANOVA and Chi-square analyses showed that all study variables significantly varied across relationship type. In both countries, never-married women tended to be younger than women in other relationship types by about 9 years. Never-married women were also more highly educated, with an average of about 12 years of completed education in the DR, and 9 years in Haiti. Never-married women were also more likely to be in the higher household income quintiles, which may reflect living in their parents' home rather than on their own. Married women whose partners live in the home were more likely to live in poorer households. Family planning behavior varied across relationship type and by country; overall, much higher proportions of women were using modern contraception in the DR, but both countries showed a pattern of married/in-union women with the partner in the home having the highest use on modern contraception, followed by married/in-union women with the partner away, formerly married women, and never-married women. Finally, with regard to the two study outcomes, HIV knowledge in both countries was highest among never-married women (56.6% of Dominican and 43.5% of Haitian never-married women had complete HIV knowledge) and lowest among married/in-union women with the partner in the home (44.6% among Dominican and 32.6% among Haitian women in this relationship type). In the DR, condom use at last sex ranged from 4.6% among married/in-union women with the partner in home, 9.3% for married/in-union women with the partner away, 36.3% for the formerly married, and 48.2% for the never married. Condom use at last sex was higher overall in Haiti than in the DR, but followed a similar pattern by relationship type, with the lowest condom use (8.4%) among married women with the partner in the home, followed by married women with the partner away (19.1%) and formerly married women (27.1%), and then by never-married women (55.9%).

Multivariate Results: HIV Knowledge

The results of logistic regression analyses for HIV knowledge stratified by relationship type and are presented in Table 18.3. *Age* was significantly, positively associated with women's HIV knowledge in both countries, for women in all relationship types except those with the partner away. *Education* was positively associated with HIV knowledge for many women in both countries: in the DR, having at least a fifth-grade education was associated with higher odds of complete HIV knowledge for married women with the partner in the home (AOR 1.75 [1.37–12.24], $P < 0.001$) and for married women with the partner away (AOR 6.95[2.08–23.2], $P < 0.01$). In Haiti, education was significantly associated with HIV knowledge for both groups of currently married or in-union women (married/partner in the home: AOR 2.13 [1.46–2.15], $P <$

0.001; married/partner away: AOR 2.53 [1.88–3.41], $P < 0.001$) as well as formerly married women (AOR 2.08 [1.16–3.74], $P < 0.05$) and never-married women (AOR 2.33 [1.30–4.16], $P < 0.01$). *Household wealth* was not consistently associated with HIV knowledge across relationship types. In the DR, significant positive associations were observed for married/in-union women with the partner in the home. In Haiti, significant positive associations were observed for women in most of the relationship types, particularly at the highest household wealth categories. Finally, *risk of pregnancy* was not associated with women's HIV knowledge in either country, with the exception of Haitian married women whose partners live in the home (AOR 1.39 [1.16–1.66], $P < 0.001$).

Multivariate Results: Condom Use at Last Sex

Table 18.4 presents the results of logistic regression analysis for condom use at last sexual intercourse, stratified by relationship type. *Age* was not significantly associated with condom use. With regard to women's *education*, in the DR education was unrelated to condom use except among married/in-union women whose partners are away; for this group the association appeared strongly positive (AOR 12.64 [1.3–123.6], $P < 0.05$), but the large size of the confidence interval suggests that the estimate of this association may be misleading. In Haiti, education was a strong predictor of condom use across all relationship types, with AORs ranging from 1.56 to 3.38 in two groups of women: married women with the partner away (AOR 2.74 [1.60–4.68], $P < 0.001$) and never-married women (AOR 4.17 [1.68–10.36], $P < 0.01$). *Household wealth* was not consistently associated with condom use. In the DR, only one group of women (the formerly married) showed an association between household wealth and condom use, and it was a negative association, such that women in the middle and fourth quintiles were less likely than women in the lowest quintile to report condom use at last sex (AORs 0.48–0.54, $P < 0.01$). In Haiti, each relationship type showed at least one significant, positive association between household wealth and condom use, and particularly clear patterns of associations—across all wealth quintiles—for the two groups of married/in-union women.

For nearly all women in both countries, *risk of pregnancy* was significantly related to condom use; specifically, women who were not at risk for pregnancy were less likely to use condoms. In other words, women who were either using modern contraception or who were pregnant at the time of the survey were less likely to use condoms than other women. In Haiti, AORs ranged from 0.21 to 0.30 (association was not significant for formerly married Haitian women). In the DR, AORs ranged from 0.22 to 0.45. Finally, HIV knowledge was, on the whole, not an important predictor of condom use. The exceptions were Haitian married/in-union women with the partner in the home and formerly married women, for whom having complete knowledge about HIV transmission and prevention was associated with higher odds of condom use (AOR 1.69 [1.26–2.27], $P < 0.01$; and AOR 2.24 [1.22–4.11] $P < 0.01$).

Discussion

This study described the social, demographic, and behavioral characteristics of women in different relationship types in the Dominican Republic and Haiti, and examined the associations of these characteristics with two outcomes—HIV knowledge and condom use at last intercourse—across relationship type. The results show that in the DR as in Haiti, never-married

women tended to be younger and more highly educated than other groups of sexually active women. Married/in-union women with the partner living in the home were more likely than other women to live in poor households. In addition, married/in-union women—both those with the partner living in the home and those with the partner living away—were more likely than other women to use modern contraception and to be pregnant. This finding about contraception and pregnancy is not surprising; in many settings, stable unions are the preferred arrangement for childbearing, and contraception is used for spacing pregnancies in addition to avoiding a first pregnancy. However, in the context of HIV prevention, prior studies show that condom use often declines when other forms of contraception are used. Therefore, healthcare providers and HIV prevention planners will need to consider how HIV prevention efforts are framed, particularly the promotion of "dual protection" against HIV and pregnancy (Berer, 2006).

Multivariate analysis provided valuable insights into understanding women's HIV knowledge and condom use behavior across relationship types. As most studies to date have only examined differences between "married" and "single" women, these findings increase our understanding of condom use behavior and call for further examination of factors such as relationship-based social norms that may facilitate or hinder condom promotion.

For *HIV knowledge*, age and education were associated with HIV knowledge for women in most relationship types. These findings are consistent with numerous studies that demonstrate that education increases women's ability to seek out information and make decisions that benefit their health, including choices about sexual behavior (Coates, Richter, & Caceres, 2008; Greig & Koopman, 2003; Gwatkin et al., 2007; Kravdal, 2002). In this study, education was dichotomized at just fifth-grade education[2], which underscores the potential positive impact of even a low threshold of educational attainment for women. For *condom use at last sexual intercourse*, results showed that age is not associated with condom use for women across relationship types in either the DR or Haiti. This is an encouraging finding for HIV prevention because it suggests that women of all ages, not just young people, can be motivated to use condoms. With regard to women's education, in Haiti, there were significant, positive associations between education and condom use for each relationship type. Prior research suggests that the positive association between education and condom use may be the result of both direct effects and indirect effects (Greig & Koopman, 2003; Rao Gupta, Parkhurst, Ogden, Aggleton, & Mahal, 2008). Education may give these women more negotiating power, may provide them awareness of their partner's behavior and/or their own risk, or may connect them to social networks in which condom use is acceptable. With regard to the other measure of SES—household wealth—the significant associations found in this study were largely among the two groups of married/in-union women in Haiti. More research is needed to understand if this is the result of the affordability of condoms, social norms supporting condom use among the higher SES groups, greater awareness of men having more than one sexual partner, or some other reason. In both countries, being *not at risk* for pregnancy (i.e., being pregnant or using modern contraception other than condoms) was associated with much lower likelihood of condom use.

[2] The regression models were also run using alternative measures of education: (1) education dichotomized at the eighth-grade level (completed primary education), and (2) a continuous measure of highest completed grade level. These models showed results similar to those presented here. The education variable dichotomized at the fifth-grade level was chosen in the final models to account for the low average education in Haiti and demonstrate that even a low level of education may be positively associated with HIV knowledge and condom use.

These women remain at risk for HIV infection, and are a key target group for future interventions. It would be feasible to reach these women with information, condoms, and risk counseling and other behavioral support when they access medical care for routine prenatal care, labor and delivery, or contraceptive methods. Such health care visits are an opportunity to reach women with information and services they may not otherwise seek out.

Finally, this study found that HIV knowledge was associated with condom use for only two groups of women in Haiti: married/in-union women with the partner in the home and formerly married women. These results confirm the findings of many prior studies of health behavior that have shown that knowledge does not necessarily lead to behavior. This is particularly true for sexual behaviors such as condom use, which are influenced by individual, interpersonal, and contextual factors (Bollinger, Cooper-Arnold, & Stover, 2004; Catania, Kegeles, & Coates, 1990; Dinkelman, Levinsohn, & Majelantle, 2006; Wingood & DiClemente, 2002). Although knowledge may be a prerequisite to behavior, knowledge alone is not sufficient to motivate the adoption of condom use among many sexually active women.

The findings from this study should be interpreted in light of two key limitations. First, detailed information on the dynamics of women's sexual relationships was not available. Dynamics such as relationship duration, level of trust, and expectation of monogamy may mediate or moderate the associations of relationship type with HIV-related outcomes, and could be critical considerations in HIV prevention efforts targeting women and couples. The current study also relied solely on the women's reports of the type of relationship they had with their sexual partners and did not include information on male partners' behavior. In particular, it would have been useful to examine male reports of partner concurrency and condom use with different partners. Future research is needed with men in different types of relationships to understand their social norms about appropriate behaviors within different relationship contexts, and their HIV knowledge and behavior. The current study advances understanding women's HIV knowledge and behavior within sexual relationship contexts. The findings suggest that continued HIV prevention efforts may want to tailor messages and strategies to women and men in different relationship types.

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Table 18.1. Weighted descriptive statistics of sexually active women aged 15–49 (Dominican Republic 2013 Demographic and Health Survey)

	Married, partner in home		**Married, partner away**		**Formerly married**		**Never married**		**Total**	
Dominican Republic	***n* = 4247**		***n* = 389**		***n* = 1106**		***n* = 478**		***n* = 6220**	
	Mean	**(SD)**	**Mean**	**(SD)**	**Mean**	**(SD)**	**Mean**	**(SD)**	**Mean**	**(SD)**
Age (years)[a]	32.6	(8.97)	30.4	(9.0)	30.6	(8.7)	21.9	(5.2)	30.9	(9.2)
Completed education (years)[a]	9.5	(4.5)	10.9	(3.7)	10.0	(3.9)	12.1	(2.8)	10.0	(4.2)
Age at first sex (years)[a]	17.7	(3.9)	18.1	(3.9)	17.1	(3.5)	18.3	(3.6)	17.3	(3.5)
	Percent	**N**	**Percent**	**N**	**Percent**	**N**	**Percent**	**N**	**Percent**	**N**
Has comprehensive knowledge about HIV	44.6	1842	45.2	177	47.3	502	56.6	241	46.5	2762
Used a condom at last sex[a]	4.6	188	9.3	36	36.3	382	48.2	231	16.0	837
Age[b]										
15–24	22.6	976	32.9	113	29.2	308	76.3	364	30.5	1761
25–34	33.7	1500	34.6	144	39.3	435	20.2	94	34.0	2173
35–49	42.7	1771	32.5	132	31.5	363	3.5	20	35.5	2286
Religion[b]										
Catholic	47.7	2049	48.7	203	50.9	540	50.4	254	48.7	3046
Protestant/other Christian	23.0	937	20.4	78	14.0	158	10.6	55	19.7	1228
Other religion/no religion	29.2	1261	30.9	108	35.1	408	38.9	169	31.6	1946
Rural residence[b]	27.0	1338	21.4	96	22.3	244	19.5	106	24.9	1784
Household wealth (national quintiles)[b]										
Poorest quintile	19.8	1112	13.8	72	17.9	224	8.4	60	17.8	1468
Second quintile	22.6	1003	15.8	69	21.5	262	10.9	67	20.7	1401
Middle quintile	20.2	827	25.3	86	21.6	248	17.2	93	20.4	1254
Fourth quintile	19.1	704	23.8	78	22.7	228	29.4	118	21.3	1128
Highest quintile	18.3	601	21.3	84	16.2	144	34.1	140	19.8	1857
Family planning behavior[b]										
At risk for pregnancy	24.7	992	39.9	163	49.3	515	71.0	338	35.7	2008
Not at risk[c]	75.3	3255	60.1	226	50.7	591	29.0	140	64.3	4212
Using modern contraception	*68.0*		*52.5*		*46.2*		*24.9*		*57.9*	
Currently pregnant	*7.3*		*7.6*		*4.5*		*4.1*		*6.4*	

Note: Means and percentages are weighted, Ns are unweighted

[a] ANOVA for distribution of means across relationship type significant at $P < 0.01$

[b] Chi-square test for distribution of proportions across relationship type significant at $P < 0.01$

[c] Not at risk for pregnancy includes women who are currently pregnant as well as women who are currently using a modern form of contraception other than condoms

Table 18.2. Weighted descriptive statistics of sexually active women aged 15–49 (Haiti 2012 Demographic and Health Survey)

	Married, partner in home		**Married, partner away**		**Formerly married**		**Never married**		**Total**	
Haiti	***n* = 4717**		***n* = 1751**		***n* = 403**		***n* = 1146**		***n* = 8017**	
	Mean	**(SD)**	**Mean**	**(SD)**	**Mean**	**(SD)**	**Mean**	**(SD)**	**Mean**	**(SD)**
Age (years)[a]	33.2	(8.2)	30.0	(8.4)	31.0	(8.4)	21.6	(4.4)	30.2	(9.0)
Completed education (years)[a]	4.9	(4.5)	6.4	(4.5)	5.6	(4.2)	9.0	(3.6)	6.1	(4.6)
Age at first sex (years)[a]	17.6	(3.6)	17.2	(3.4)	16.4	(2.8)	17.3	(3.3)	17.4	(3.5)
	Percent	**N**	**Percent**	**N**	**Percent**	**N**	**Percent**	**N**	**Percent**	**N**
Has comprehensive knowledge about HIV	32.6	3254	35.8	592	34.6	137	43.5	483	35.5	2675
Used a condom at last sex[a]	8.4	360	19.1	295	27.1	117	55.9	638	20.8	1410
Age[b]										
15–24	16.8	784	32.2	526	26.9	92	76.9	894	32.2	2296
25–34	40.2	1896	38.0	694	37.6	159	22.2	240	36.2	2989
35–49	43.1	2037	29.8	531	35.5	152	0.9	12	31.7	2732
Religion[b]										
Catholic	40.6	1997	46.6	881	46.4	190	38.1	498	41.9	3566
Protestant/other Christian	52.0	2420	45.4	753	44.1	180	55.3	583	50.6	3936
Other religion/no religion	7.4	300	8.0	117	9.5	33	6.6	65	7.5	515
Rural residence[b]	59.0	2964	50.8	968	46.0	179	43.7	538	53.5	4649
Household wealth (national quintiles)[b]										
Poorest quintile	20.2	1220	12.6	311	8.9	41	8.9	156	15.7	1728
Second quintile	18.1	921	16.9	352	14.7	71	11.4	166	16.4	1510
Middle quintile	20.9	1078	20.7	429	27.9	128	17.4	227	20.6	1862
Fourth quintile	21.5	851	24.2	353	23.0	91	24.7	264	22.8	1559
Highest quintile	19.3	647	25.6	306	25.5	72	37.5	333	24.5	1358
Family planning behavior[b]										
At risk for pregnancy	61.4	2830	68.3	1170	79.0	311	93.5	1058	70.0	5369
Not at risk[c]	38.6	1887	31.7	581	21.0	92	6.5	88	30.0	2648
Using modern contraception	*29.0*		*21.5*		*17.5*		*3.6*		*21.9*	
Currently pregnant	*9.6*		*10.2*		*3.5*		*2.9*		*8.2*	

Note: Means and percentages are weighted, Ns are unweighted

[a] ANOVA for distribution of means across relationship type significant at $P < 0.01$

[b] Chi-square test for distribution of proportions across relationship type significant at $P < 0.01$

[c] Not at risk for pregnancy includes women who are currently pregnant as well as women who are currently using a modern form of contraception other than condoms

Table 18.3. Logistic regression results (adjusted odds ratios) for HIV knowledge among women aged 15–49, Dominican Republic and Haiti

	Married, partner in home			**Married, partner away**			**Formerly married**			**Never married**		
Dominican Republic	***n* = 4247**			***n* = 389**			***n* = 1106**			***n* = 478**		
	AOR		**95% CI**	**AOR**		**95% CI**	**AOR**		**95%CI**	**AOR**		**95% CI**
Age	1.12	**	[1.04–1.21]	1.22		[0.95–1.59]	1.22	*	[1.04–1.42]	1.71	**	[0.77–1.44]
Age squared	1.00		[1.00–1.00]	1.00		[0.99–1.00]	0.99	*	[0.99–1.00]	0.99	**	[0.99–1.01]
Education												
Less than fifth grade	Ref.			Ref.			Ref.			Ref.		
Fifth grade or higher	1.75	†	[1.37–2.24]	6.95	**	[2.08–23.2]	1.38		[0.75–2.52]	0.52		[0.68–7.85]
Household wealth category												
Lowest quintile	Ref.			Ref.			Ref.			Ref.		
Second quintile	1.52	†	[1.20–1.92]	2.56		[0.98–6.65]	1.14		[0.73–1.80]	0.55		[0.17–1.78]
Middle quintile	1.77	**	[1.22–2.59]	1.37		[0.62–3.03]	1.12		[0.70–1.80]	0.72		[0.22–2.40]
Fourth quintile	1.67	**	[1.23–2.28]	2.49		[0.87–7.08]	1.11		[0.65–1.90]	1.92		[0.60–6.16]
Highest quintile	1.84	**	[1.30–2.60]	3.13	*	[1.30–7.57]	1.65		[0.99–2.76]	1.76		[0.54–5.72]
Family planning behavior												
At risk of pregnancy	Ref.			Ref.			Ref.			Ref.		
Not at risk[a]	1.04		[0.79–1.37]	0.95		[0.52–1.75]	0.84		[0.59–1.20]	1.60		[0.91–2.8]
Haiti	***n* = 4717**			***n* = 1751**			***n* = 403**			***n* = 1146**		
	AOR		**95% CI**	**AOR**		**95% CI**	**AOR**		**95%CI**	**AOR**		**95% CI**
Age	1.09	*	[1.00–1.19]	1.02		[0.87–1.19]	1.46	*	[1.04–2.05]	1.42	*	[1.08–1.88]
Age squared	1.00		[1.00–1.00]	1.00		[1.00–1.00]	0.99	*	[0.99–1.00]	0.99	*	[0.99–1.00]
Education												
Less than fifth grade	Ref.			Ref.			Ref.			Ref.		
Fifth grade or higher	2.13	†	[1.46–2.15]	2.53	†	[1.88–3.41]	2.08	*	[1.16–3.74]	2.33	**	[1.30–4.16]
Household wealth category												
Lowest quintile	Ref.			Ref.			Ref.			Ref.		
Second quintile	0.41		[0.97–1.75]	1.17		[0.75–1.81]	0.28	*	[0.08–0.95]	1.64		[0.87–3.11]
Middle quintile	0.93	**	[1.16–2.00]	1.12		[0.74–1.68]	0.77		[0.25–2.35]	1.92		[0.99–3.73]
Fourth quintile	0.93	†	[1.29–2.27]	1.71	*	[1.09–2.67]	1.14		[0.40–3.22]	2.98	†	[1.62–5.48]
Highest quintile	3.41	†	[1.83–3.46]	2.22	**	[1.40–3.50]	1.52		[0.48–4.81]	2.86	**	[1.58–5.19]
Family planning behavior												
At risk of pregnancy	Ref.			Ref.			Ref.			Ref.		
Not at risk[a]	0.29		[0.78–1.16]	1.10		[0.81–1.50]	1.66		[0.80–3.44]	0.76		[0.40–1.43]

*$P < 0.05$; **$P < 0.01$; †$P < 0.001$

Regressions used survey estimation procedures, which apply weights and account for the complex sampling designs of the two surveys

[a] Not at risk for pregnancy includes women who are currently pregnant as well as women who are currently using a modern form of contraception other than condoms

Table 18.4. Logistic regression results (adjusted odds ratios) for condom use at last sex among women aged 15–49, Dominican Republic and Haiti

	Married, partner in home			**Married, partner away**			**Formerly married**			**Never married**		
Dominican Republic	***n* = 4247**			***n* = 389**			***n* = 1106**			***n* = 478**		
	AOR		**95% CI**	**AOR**		**95% CI**	**AOR**		**95%CI**	**AOR**		**95% CI**
Age	1.05		[0.90–1.24]	1.10		[0.77–1.57]	1.13		[1.00–1.36]	1.26		[0.92–1.72]
Age squared	1.00		[1.00–1.00]	1.00		[0.99–1.00]	1.00		[0.99–0.99]	1.00		[0.99–1.00]
Education												
Less than fifth grade	Ref.			Ref.			Ref.			Ref.		
Fifth grade or higher	1.70		[0.98–2.94]	12.64	*	[1.3–123.6]	1.92		[0.91–4.03]	0.59		[0.09–3.95]
Household wealth category												
Lowest quintile	Ref.			Ref.			Ref.			Ref.		
Second quintile	1.00		[0.56–1.80]	0.65		[0.16–2.65]	0.74		[0.50–1.09]	0.52		[0.14–1.91]
Middle quintile	0.96		[0.51–1.79]	1.21		[0.32–4.63]	0.54	**	[0.34–0.85]	0.90		[0.30–2.67]
Fourth quintile	1.26		[0.68–2.36]	0.27		[0.05–1.33]	0.48	**	[0.29–0.80]	1.12		[0.36–3.49]
Highest quintile	1.37		[0.66–2.84]	0.82		[0.23–2.94]	0.64		[0.36–1.16]	1.18		[0.40–3.43]
Family planning behavior												
At risk of pregnancy	Ref.			Ref.			Ref.			Ref.		
Not at risk[a]	0.22	†	[0.15–0.34]	0.36	*	[0.15–0.90]	0.45	†	[0.30–0.66]	0.38	**	[0.22–0.66]
HIV knowledge												
Incomplete	Ref.			Ref.			Ref.			Ref.		
Complete	1.40		[0.95–2.05]	1.00		[0.45–2.20]	0.93		[0.66–1.30]	0.84		[0.49–1.43]
Haiti	***n* = 4717**			***n* = 1751**			***n* = 403**			***n* = 1146**		
	AOR		**95% CI**	**AOR**		**95% CI**	**AOR**		**95%CI**	**AOR**		**95% CI**
Age	1.08		[0.93–1.25]	0.90		[0.77–1.05]	0.87		[0.62–1.21]	0.89		[0.68–1.16]
Age squared	1.00		[1.00–1.00]	1.00		[1.00–1.00]	1.00		[1.00–1.00]	1.00		[1.00–1.01]
Education												
Less than fifth grade	Ref.			Ref.			Ref.			Ref.		
Fifth grade or higher	1.56	*	[1.02–2.36]	2.01	**	[1.24–3.25]	3.38	**	[1.67–6.83]	2.57	†	[1.53–4.31]
Household wealth category												
Lowest quintile	Ref.			Ref.			Ref.			Ref.		
Second quintile	1.90	*	[1.02–3.56]	2.42	*	[1.10–5.36]	2.06		[0.53–8.03]	1.24		[0.72–2.15]
Middle quintile	3.36	†	[1.86–6.07]	3.77	**	[1.52–9.36]	3.06		[0.88–10.68]	1.32		[0.78–2.25]
Fourth quintile	3.56	†	[1.92–6.59]	6.99	†	[2.95–16.56]	5.04	**	[1.57–16.27]	1.58		[0.91–2.77]
Highest quintile	4.75	†	[2.51–8.99]	6.19	†	[2.54–15.05]	3.00		[0.85–10.49]	1.83	*	[1.08–3.11]
Family planning behavior												
At risk of pregnancy	Ref.			Ref.			Ref.			Ref.		
Not at risk[a]	0.21	†	[0.14–0.32]	0.28	†	[0.18–0.46]	0.80		[0.39–1.63]	0.30	†	[0.16–0.55]

HIV knowledge												
Incomplete	Ref.			Ref.			Ref.			Ref.		
Complete	1.69	**	[1.26–2.27]	1.05		[0.74–1.50]	2.24	**	[1.22–4.11]	1.10		[0.81–1.49]

*$P < 0.05$; **$P < 0.01$; †$P < 0.001$

Regressions used survey estimation procedures, which apply weights and account for the complex sampling designs of the two surveys

[a] Not at risk for pregnancy includes women who are currently pregnant as well as women who are currently using a modern form of contraception other than condoms